

AMENDMENT TO THE CLAIMS

1-7. (Canceled)

8. (Currently Amended) A method for assessing predisposition to increased weight gain feeding and/or weight gain pattern in a subject ~~in need thereof~~, comprising measuring desacetyl- α -MSH and α -MSH peptides in a sample obtained from said subject, calculating the desacetyl- α -MSH/ α -MSH ratio, and comparing the calculated ratio with a reference ratio from a control, wherein an increase in the calculated desacetyl- α -MSH/ α -MSH ratio above the reference ratio is indicative of a predisposition to increased weight gain ~~an imbalance in feeding and/or weight gain pattern~~ in the subject.

9. (Currently Amended) A method for predicting predisposition to developing risk of obesity in a subject ~~in need thereof~~, comprising measuring desacetyl- α -MSH and α -MSH peptides in a sample obtained from said subject, calculating the desacetyl- α -MSH/ α -MSH ratio, and comparing the calculated ratio with a reference ratio from a control, wherein an increase in the calculated desacetyl- α -MSH/ α -MSH ratio above the reference ratio is indicative of a predisposition to developing obesity ~~predictive of increased risk of obesity in the subject~~.

10. (Canceled)

11. (Currently Amended) A method for diagnosing imbalance in energy homeostasis in a subject ~~in need thereof~~, comprising measuring desacetyl- α -MSH and α -MSH peptides in a sample obtained from said subject, calculating the desacetyl- α -MSH/ α -MSH ratio, and comparing the calculated ratio with a reference ratio from a control, wherein an increase in the calculated desacetyl- α -MSH/ α -MSH ratio above the reference ratio is diagnostic of an imbalance in energy homeostasis in the subject.

12-14. (Canceled)

15. (Currently Amended) A method according to any one of claims 8, 9, or 11 [[8-11]], wherein the desacetyl- α -MSH and α -MSH peptides are measured by a biological

response system capable of predicting the risk of metabolic disorders leading to obesity developing obesity, or diagnostic of obesity, imbalance in energy homeostasis or disturbance in feeding/weight gain patterns, and wherein the resulting profile of response parameters is indicative predictive of the risk of metabolic disorders leading to developing obesity or diagnostic of obesity, imbalance in energy homeostasis or disturbance in feeding/weight gain patterns.

16. **(Currently Amended)** A method of assessing predisposition to developing a metabolic disorder leading to risk of developing obesity in a subject, ~~diagnosing obesity~~ or diagnosing an imbalance in energy homeostasis or disturbance in feeding/weight gain patterns predisposing the subject to increased weight gain or obesity in a subject in need thereof, comprising:

- a. measuring the amount of α -MSH and desacetyl- α -MSH in a sample obtained from the subject, either directly or by subtraction of one of the amount of α -MSH or desacetyl- α -MSH from a measured amount of total MSH in the sample,
- b. calculating the ratio of the amounts of desacetyl- α -MSH to α -MSH,
- c. comparing the calculated ratio of desacetyl- α -MSH to α -MSH with a reference ratio from a control,

wherein an increase in the calculated desacetyl- α -MSH/ α -MSH ratio above the reference ratio is indicative of the subject's predisposition to developing metabolic disorder leading to subject being at risk of development of obesity, ~~diagnostic of obesity~~ or diagnostic of an imbalance in energy homeostasis or disturbance in feeding/weight gain patterns predisposing the subject to increased weight gain or obesity.

17. **(Currently Amended)** A method according to any one of claims 8, 9, 11 and 16 8-11 and 16, wherein the measurement is quantitative.

18. **(Currently Amended)** A method according to any one of claims 8, 9, 11 and 16 8-11 and 16, wherein α -MSH and desacetyl- α -MSH are separated from the sample before measurement.

19. **(Original)** A method according to claim 18, wherein α -MSH and desacetyl- α -MSH are separated by a procedure selected from the group consisting of chromatography, electrophoresis, immunocapture and affinity capture.
20. **(Currently Amended)** A method according to any one of claims 8, 9, 11 and 16 ~~8-11 and 16~~, wherein α -MSH or desacetyl- α -MSH is measured by an immuno-assay.
- 21-22. **(Canceled)**
23. **(Currently Amended)** A method according to any one of claims 8, 9, 11 and 16 ~~8-11 and 16~~, wherein the subject is a mammal.
24. **(Canceled)**
25. **(Currently Amended)** A method according to any one of claims 8, 9, 11 and 16 ~~8-11 and 16~~, wherein the sample is a biological fluid selected from the group consisting of whole blood, plasma, serum, saliva, sweat, urine, amniotic fluid, cord blood and cerebrospinal fluid.
- 26-28. **(Canceled)**
29. **(Previously Presented)** A method according to claim 15, wherein the biological response system is an *in vitro* cell, organ or tissue sample, or whole animal capable of responding to desacetyl- α -MSH and α -MSH peptides.
30. **(Original)** A method according to claim 29, wherein the *in vitro* cell is selected from the group consisting of primary osteoblasts, osteosarcoma cell line, hypothalamic cell line, adipocytes, myocytes, melanoma cells and anterior pituitary cells.
31. **(Canceled)**
32. **(Previously Presented)** A method according to claim 15, wherein the profile of response parameters measured comprise one or more proteins or cellular events which differentiate between normal subjects and those at risk of developing obesity or having obesity, or those with an imbalance in energy homeostasis, or disturbance in feeding/weight gain patterns.

33. **(Previously Presented)** A method according to claim 32, wherein the one or more proteins are selected from the group consisting of heat shock protein homologue, glyceraldehyde-3-phosphate-dehydrogenase, aldo-keto reductase, citrate synthase, creatine kinase, pyruvate synthase alpha-chain, f1 ATPase beta-chain, tubulin beta-chain, proteins involved in the melanocortin peptidergic axis, proteins involved in signaling pathways and membrane-bound proteins.
34. **(Canceled)**
35. **(Currently Amended)** The method of any one of claims 8, 9, 11 and 16 ~~8-11 and 16~~, wherein the control is a sex and age matched control.
36. **(New)** A method for assessing feeding and/or weight gain pattern that predisposes a subject to increased weight gain or obesity, comprising measuring desacetyl- α -MSH and α -MSH peptides in a sample obtained from said subject, calculating the desacetyl- α -MSH/ α -MSH ratio, and comparing the calculated ratio with a reference value ratio from a control, wherein an increase in the calculated desacetyl- α -MSH/ α -MSH ratio above the reference ratio is indicative of a feeding and/or weight gain pattern that predisposes the subject to increased weight gain or obesity.